Cheng Zhang

Résumé For 2022 Internship

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🖹 *Full CV*

Education

2018 — Now **Computer Science, Ph.D.**, Boston University, Boston, MA

Primary Interest: Algebra Method in Program Analysis

I have also worked on program analysis, type systems, and many intersections between computer science and mathematics.

2021 **Oregon Programming Language Summer School (OPLSS)**, University of Oregon, Eugene, OR

OPLSS is one of the most prestigious summer school in the field of Programming Language. This year it is focused on foundation of programming and security; I have attended courses involving verification of probabilistic programs, session type for concurrent programming, and categorical semantics of advanced type systems, etc.

2014 — 2018 **Mathematics, B.A.**, *with department honor, magna cum laude*, Wheaton College, Norton, MA

Honor Thesis: King in Generalized Tournaments.
Minors: Computer Science, Economics.

2016 — 2017 **Economics, Study Aboard**, London School Of Economics, London, United Kingdom

Publications And Preprints

2022 **Mark Lemay, Qiancheng Fu, Cheng Zhang, William Blair, Hongwei Xi**, *Gradual Correctness: a Dependently Typed Language with Dynamic Equality*, Submitted to Certified Programs and Proofs (CPP)

2022 **Cheng Zhang, Arthur Azevedo de Amorim, Marco Gaboardi**, *On Incorrectness Logic and Kleene Algebra With Top and Tests*, Principle Of Programming Language (POPL)

2020 **Mark Lemay, Cheng Zhang, William Blair**, *Developing a Dependently Typed Language with Runtime Proof Search (Extended Abstract)*, Workshop on Type-Driven Development (TyDe)

2018 **Cheng Zhang**, *King in Generalized Tournaments*, Wheaton College Honor Thesis

2018   **Cheng Zhang, Weiqi Feng, Emma Steffens, Alvaro de Landaluce, Scott Kleinman, Mark D. LeBlanc**, *Lexos 2017: Building Reliable Software in Python*, Journal of Computing Sciences in Colleges

Research Talks

2018   **Cheng Zhang, Mark D. LeBlanc**, *Lexos 2017: Building Reliable Software in Python*, Conference for Computing in Small Colleges, UNH-Manchester

2018   **Cheng Zhang**, *Kings in Quasi-transitive Oriented Graph*, Wheaton Summit For Woman In STEM

Research Projects

2021 — Now   **Probabilistic Kleene Algebra**, *Boston University*, Boston, MA

Examine the mathematical foundation of probabilistic Kleene Algebra and its potential application in analysis of probabilistic programs. This work will give rise to a unified approach to analysis probabilistic programs, provide ways to prove program correctness, and identify the probability to encounter bugs in probabilistic programs.

2020 — Now   **Algebraic Formulation Of Incorrectness Logic**, *Boston University*, Boston, MA

Provide a algebraic formulation of Incorrectness Logic in TopKAT. Our work leads to simpler proofs for program incorrectness, and demonstrates ways to automatically certify about bugs in programs. We have also showed that TopKAT is a minimal framework to model incorrectness, as it is impossible to encode incorrectness logic in KAT.

2017 — 2018   **Mathematics Honor Thesis**, *Wheaton College*, Norton, MA

Studied kings in generalizations of tournament, with a special focus on quasi-transitive oriented graphs. I have shown that all the quasi-transitive oriented graphs can be condensed into a tournament via tie component condensation, and tie component condensation of quasi-transitive oriented graphs is the most efficient condensation to tournament.

2015 — 2018   **Software Lead**, *Lexomics Research Group, Wheaton College*, Norton, MA

Led a group of undergraduate engineers through a major factorization of the natrual language processing (NLP) software Lexos. In the process, I implemented modern software development workflows and transitioned the code base to a functional-first paradigm for ease of maintenance. I have also proposed a new architecture for side-effect management in Python.

Honors And Fellowships

2018 — Now   A member of Phi Beta Kappa Honor Society.

2018   Boston University Dean's Fellowship.

2018   Phi Beta Kappa Graduate Scholarship.

2018   Madeleine F. Clark Wallace Mathematics Prize.

2018	Fred Kollett Prize in Mathematics & Computer Science.
2017	Weaton College Faculty-Student Research Awards.
2016	Wheaton Fellows.
2014 — 2018	Wheaton College Dean's Lists.
2014 — 2018	Wheaton College International Scholarship.

Technical Skills

Programming Languages: Haskell, Ocaml, ATS, TypeScript, C#, Java, C++

Scripting Languages: Python, Powershell, JavaScript, Mathematica

Formal Methods: Coq, Lean, MathComp Z3, EasyCrypt, Agda

Data Processing: Panda, Scikit-Learn, Numpy, R, Stata

Tools: Git, LaTeX, SSH, Jupyter Notebook

Professional Experiences

2019 — Now Graduate Researcher, *Boston University*, Boston, MA

Study various extensions of Kleene Algebra, and their use in program analysis of imperative/functional programs, probabilistic programs, distributed systems, networks, etc. My researches provide easier, even automated, proofs for program analysis.

2019 — 2021 Teaching Fellow, *Boston University*, Boston, MA

Taught Principle of Programming Language, Introduction to Computer Science, Algebra Algorithm, Geometric Algorithm, etc.

2021 — Now Organizer, *Principle of Programming and Verification Seminar*, Boston University, Boston, MA

Invite seminar speakers and coordinate time of the talks; maintain seminar webpage, mailing list, and calendar; and host the speaker during the seminar.

2020 — Now Organizer, *Programming Language Reading Group*, Boston University, Boston, MA

Assign the reading material every week, organize and schedule the weekly meeting for the reading group, and host the discussion on the reading material.

2019 Grader, *Boston University CS 511 Formal Method*, Boston, MA

Provided solutions to homework problems, graded the homework, organize useful statistics for the professor, and provided hints and answered questions piazza when necessary.

2017 — 2018 Grader, *Wheaton College MATH 241 Theory of Probability*, Norton, MA

Graded homework, gave feedback to students on each individual homework, and provide informative statistics to the professor on the homework.